PORTS AND THE 'LOGISTIC REVOLUTION'

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'You'd like to think yesterday could be a player in tomorrow's game,
but often as not everything simply gets rained out'
(Kinky Friedman, **Blast from the past**)

1. Outline

In dealing with ports and the " logistic revolution", one has to be aware of the magnitude of passenger and goods transport in Europe, its substantial growth over past years as well projections of future growth. This sets the stage for positioning both airports and seaports, including national careers and transhipment companies.

Future trends in European goods transport, largely (though not exclusively) depend on the further development of logistics. A logistic reconfiguration is under way. And logistic service providers are among the key players. Simple extrapolations of past trends in transport demand, however, provide poor guidelines for the future. So does the (implicit) assumption of structures and networks of freight transport to remain unchanged.

In fact, major uncertainties need to be faced affecting both airports and seaports.
The future of ports in Europe seems to revolve about three issues:

- the change from "volume thinking" to "logistic thinking",
- the management of uncertainties,
- the need of a EU approach.

2. Transport in facts and figures

During the last 25 years European mobility in goods transport and passenger transport has grown substantially, both nationally and internationally. Total performance in terms of passenger- and tonne-kilometres has doubled since 1970. Its causes stem from economic, demographic social and political changes, since transport is a derivative economic activity.

2.1 European passenger transport

Table 2.1 gives an overview of the development of passenger mobility for the period 1970 - 1997. In this period the modal share of passenger cars has increased from 73.6 % to 78.7 %, mainly at the expense of the modes tram & metro and railway.

Between 1970 and 1997 the performance of air passenger transport in terms of passenger kilometres has increased dramatically with an average of 7 % per year.

	Passenger cars	**Buses & Coaches**	**Tram & Metro**	**Railway**	**Air**	**Total**
1970	1 582	268	38	216	43	2 148
1980	2 343	341	40	253	96	3 072
1990	3 317	360	48	274	204	4 203
1994	3 606	363	41	270	254	4 535
1995	3 679	373	41	269	274	4 636
1996	3 738	375	41	279	290	4 723
1997	3 804	381	41	282	322	4 831
1990 - 1997	**+ 15%**	**+ 6%**	**- 13%**	**+ 3%**	**+58%**	**+ 15%**

Table 2.1 Performance of passenger transport (EU 15) by mode (1000 Mio pkm)

Source: EU - DG VII

The important origin and destination relations in the EU in 1994 were: Germany - Spain 12.61 Mio pkm, Spain - Germany 12.5 Mio pkm, U.K. - Spain 17.65 Mio pkm and Spain - U.K. 17,31 Mio pkm.

Accordingly, the most significant airports in the EU in terms of passengers are Heathrow (U.K.), Frankfurt (D) and Charles de Gaulle (F): see table 2.2. One notes that the airports within Northwest Europe dominate the scene. So do the national carriers (see table 2.3)

Airport	Country	1970	1980	1990	1996	1997	Change 96/97 (%)	Change 70/97 (%)
Heathrow	UK	15.6	27.5	43.0	55.8	58.0	3.8	371.8
Frankfurt	D	9.4	17.6	29.4	38.8	40.3	3.9	428.7
Ch. De Gaulle	F	2.2	10.1	22.5	31.7	35.3	10.9	1604.5
Schiphol	NL	5.2	9.4	16.5	27.8	31.6	13.6	607.7
Gatwick	UK	3.7	9.7	21.2	24.1	27.0	10.8	729.2
Orly	F	10.4	15.7	24.3	27.4	25.1	-8.4	241.3
Rome	I	6.5	11.4	17.7	23.8	25.0	8.5	384.6
Madrid	E	4.8	10.1	16.2	21.9	23.6	8.0	491.7
Munchen	D	3.6	6.0	11.4	15.7	17.9	14.1	497.2
Copenhagen	DK	6.5	8.6	12.1	15.9	16.8	6.2	285.5
Palma de M.	E	4.8	7.3	11.3	15.4	16.6	7.7	345.8
Manchester	UK	1.9	4.3	10.1	14.8	16.2	9.1	852.6
Brussels	B	2.8	5.1	7.1	13.5	15.9	17.9	567.8
Dusseldorf	D	3.6	7.2	11.9	14.4	15.5	7.7	430.6
Stockholm	S	2.6	4.3	14.0	15.0	15.2	15.2	584.6
Total 20 largest	**EU**	**97.6**	**180.8**	**308.3**	**410.8**	**440.3**	**7.2**	**451.1**

Table 2.2 Performance of air passenger transport for selected major airports. Total passenger movements in million passengers (Source: EU - DG VII)

Airline	Country	1980	1990	1996	1997	change 97/96	change 97/90	In Europe
British Airways	UK	16.08	44.66	100.56	105.7	5.1%	557.3%	15.62
Lufthansa	D	21.06	42.10	63.26	71.35	12.8%	228.8%	14.03
Air France	F	25.40	36.62	57.47	69.99	21.8%	175.6%	8.22
KLM	NL	14.06	28.17	48.86	55.39	6.52%	294.0%	6.52
Alitalia	I	12.88	19.13	34.56	35.99	4.1%	179.4%	7.90
Iberia	E	14.85	20.49	25.92	27.63	6.6%	86.0%	6.82
SAS	DK/N/S	7.53	11.52	19.49	20.33	8.54%	170.0%	8.54
Sabena	B	4.85	5.91	9.01	11.27	4.52%	132.4%	4.52
Total 14 largest	**EU**	**130.50**	**234.05**	**395.20**	**437.88**	**10.8%**	**235.5%**	**89.00**

Table 2.3 Performance of major EU airlines. Scheduled services, national and international. (1000 million pkm) (Source: EU - DG VII)

2.2 European goods transport

Economic growth, in recent years, definitely had a positive effect on the demand for freight transport. In the period 1970 - 1995 total performance of freight transport in the EU increased by 70%, from 890 billion tkm in 1970 to 1,524 billion tkm in 1995. The modal share of road freight transport in this period rose from 47.9 % to 73.2 %, while that of rail declined from 32.6 % to 14.1 %. Table 2.4 gives a historic overview of the modal split of freight transport in the EU.

	Road	Rail	Inland Waterways	Pipelines
1970	47.9	32.6	11.9	7.6
1980	56.3	25.8	9.6	8.3
1990	67.9	18.6	7.9	5.6
1994	72.4	14.5	7.4	5.7
1995	73.2	14.1	7.3	5.4
1996	73.5	14.0	7.1	5.4
1997	73.2	14.4	7.2	5.2

Table 2.4 Modal split of goods transport (EU 15) (tkm in %) (Source: EU - DG VII)

Between the EU countries there are remarkable differences in the modal shift. Modal share of road transport in Austria was only 38.2 % in 1997 while it was nearly 100 % in Greece. Inland waterways play an important (economic) role in the Netherlands (42.8% in 1997), while they are absent in freight transport in Greece, Spain, Ireland, Portugal and Sweden. Whereas rail still played a vital part in 1997 in Austria (37%), Spain (36.6%), Finland (27.6%) and France (16.9%). Despite all policy measures taken by the EC and the various national governments to shift freight transport from road to other modes, only in Denmark and Austria this kind of structural change seems to have happened.

Let us now take a look at the development in traffic of the major seaports in the EU. In the period 1970 - 1997, traffic of the 20 major EU seaports expanded from 861 million tons to 1,251 million tons. This growth of 45.3 %, with an average of 1.8 % per year, is far less than the growth of road freight transport in that same period. Table 2.5 gives an overview of the development of port traffic of the major ports within the Hamburg - Le

Havre range, 1970 - 1997. Together they account for 55 % of all port traffic in the top 20 EU seaports.

Port	1970	1980	1990	1996	1997	Change 80/97 %
Rotterdam	226	276	288	284	303	9.8
Antwerp	78	82	102	107	112	36.5
Hamburg	47	63	61	71	77	22.2
Le Havre	58	77	54	56	60	-22.0
Amsterdam	21	34	47	55	57	67.6
London	64	48	58	53	56	16.6
Dunkerque	25	41	37	35	37	-23
Bremen	23	25	29	34	33	43.5
Zeebrugge	8	12	30	28	32	166.6
Sum of top 20 EU ports	**861**	**1068**	**1088**	**1196**	**1251**	**17.1**

Table 2.5 Development of port traffic of major ports within the Hamburg - Le Havre range, 1970 - 1997 (million tons). (Source: EU, DG VII)

Compared to its nearest competitors, Antwerp, Zeebrugge and Hamburg, the port of Rotterdam - still by far the largest seaport in the EU - does not show high growth rates in the period 1980 - 1997. In fact, its relative share has declined. This also holds for its position in maritime container transport within the HLH range.

Port	1990	1995	1990	1997	Change 90/97 %
Rotterdam	3667	4787	4971	5445	48.5
Antwerp	1549	2329	2654	2969	91.7
Hamburg	1969	2890	3054	3338	69.5
Le Havre	858	970	1020	1185	38.1
Felixstowe	1436	1924	2065	2237	55.8
Zeebrugge	342	528	553	n.a.	n.a.
Bremen	1198	1524	1543	1703	42.1

Sum of top 30 EU ports	17348	25059	27630	n.a.	n.a.
Hong Kong	5101	12550	13460	14386	182.0
Singapore	**5224**	**11846**	**12944**	**14136**	**170.6**

Table 2.6 Development of container traffic of major ports within the Hamburg - Le Havre range, 1990 - 1997 (1000 TEU). (Source: EU - DG VII)

In the EU containers are transported by various modes of transport: road, rail and inland waterways. For Rotterdam the latter is very important. More than 30% of the container traffic is transported by inland waterway barges. Along the river Rhine some 25 multimodal inland waterway terminals are situated which function as logistical nodes in the hinterland traffic of maritime containers. The modal share of inland waterways may even increase due to recent technological changes in shipping technology, which enables modern barges to carry 700 TEU of container cargo. At the sea side one observes also increasing economies of scale in container transport. Today "megacarriers" like Maersk, Evergreen, CSX-Sealand or P&O Nedlloyd use vessels with a size of 4000 - 6000 TEU. These mega container vessels are most efficient when they call only at a few ports. They used to call at approximately six ports in Europe. But the growth of vessels reduces the calls at ports to a maximum of three. This reduction will have an enormous effect on the positioning of the ports but also on the hinterland connections. The sea connections are also affected by this as short -sea connections are increasing. Inter port competition within the HLH range will increase. At the end of the day, ports will have an over-capacity.
In (nearly) every port within the HLH-range container traffic is dominated by a large transhipment company: ECT in Rotterdam, HHLA in Hamburg, BLG in Bremen, Hessenatie in Antwerp and PAH in Le Havre. The dominance of one single company in goods transport holds even stronger for airport goods traffic, where the national "flag carrier" is the favoured one.

In the period 1986 - 1997 air cargo traffic through EU airports has increased with an average of 6.5% per year. Frankfurt is by far the largest air cargo airport in the EU. Up to 60 % of the airport traffic is transported in so-called combi-aircrafts. The greatest increase in air cargo traffic has taken place at the airports of Brussels, Luxembourg and Köln: see table 2.7.

Brussels is the European "hub" for companies like Federal Express, DHL and Emery. Its is also the "trucking" hub for UPS. The European hubs of TNT, XP and UPS are located at Köln airport. At the same time Cologne is a satellite airport for Frankfurt (Lufthansa).

	1986	1990	1995	1997	Annual change % 86/96
Frankfurt	823	1106	1297	1373	5.0
London	720	951	1437	1570	7.1
Paris	713	872	1113	1129	4.6
Amsterdam	451	605	978	1161	9.1
Brussels	192	282	427	518	8.9
Zürich	221	256	327	335	3.9
Luxembourg	78	143	288	382	13.7
Köln	96	163	276	382	12.9
Total of top EU 25 airports	**n.a**	**7272**	**7667**	**8324**	**n.a.**

Table 2.7 Air cargo traffic at selected major air ports in EU (1000 tons) (Source: EU - DG VII)

Road freight transport is a vital link in the logistical chains of airfreight cargo. Pre- and end haulage of air cargo is done by road. But also the transport of air cargo 'under flightnumber' between different European airports takes place by road, so-called "trucking of air cargo" (IATA resolution 507b). It is estimated that at least 30 per cent of all intra EU air cargo is transported by road (600 000 tons in 1992). Some experts even suggest that it is up to 70 % (NEA, 1992). Nearly 90% of all air cargo trucking takes place between the airports of Amsterdam, Brussels, Koln, Frankfurt, Paris and to a a lesser extent, Milan and Zürich.

2.3 Future passenger and freight transport in the EU

Since 1970 European freight transport has increased by about 70 %. Annual growth of about 2 % is expected for the next two decades. Table 2.8 gives a detailed overview of future freight transport in the EU. The table is based on projections by the NEAC transport simulation system. The NEAC model is demand orientated using an adjusted economic reference scenario of the EC (the so-called High Five Scenario) with the base year 1994: total transport of commodities between regions in the EU is explained as a function of economic production and 'attraction' indicators such as food consumption. 14 sectors and 11 commodity groups, which are most relevant for freight transport, are distinguished. Transport cost is treated as exogenous to economic growth.

	Road	Rail	Inland waterways	Total Index = 1994
Austria	28.5	21.5	3.0	163
Belgium/Luxembourg	65.8	12.1	7.3	156
Denmark	14.7	3.3	0.0	143
Finland	31.9	12.6	8.1	133
France	259.4	64.5	9.0	132
Germany	565.9	126.5	84.5	190
Greece	19.0	0.5	0.0	149
Ireland	7.5	1.0	0.0	161
Italy	169.9	29.4	0.2	136
Netherlands	56.8	4.5	48.7	169
Portugal	16.7	2.5	0.0	152
Spain	196.9	15.0	0.0	147
Sweden	53.1	33.7	0.0	192
United Kingdom	237.6	17.7	0.4	139
EU 15	**1724**	**345**	**161**	**150**

Table 2.8 Estimation of future freight transport performance situation 2010, modal split (tkms) (Source: NEA – DHV)

In the period 1994 - 2010 freight transport in ton-kilometers in the EU - 15 is expected to increase by around 50 % (counting all transport where the origin and/or the origin country is located in the EU 15. In all countries, except Germany due to the unification, international transport (in ton-kilometers) will grow significantly faster than domestic freight transport.

Freight transport in tons per year is expected to grow less than the economy since there will be more efficient logistical production and transport systems. On the other hand distances will increase significantly because of the internationalization and specialization of economic activities and trade liberalization.

Table 2. 9 shows the performance of passenger transport for the year 2010, projected by IFO for the EC (DHV, 1998). The IFO model used is an extrapolation of total passenger transport from the base year 1990 as a function that includes car ownership, income elasticity and travel cost and travel time. It is assumed that car ownership will increase as a function of GDP, growing faster than income, as it is a luxury good. Transport time is assumed to be more important than cost. In fact it is at this moment the only internally consistent model available for all countries of the EU.

	Passenger cars	Buses	Rail	Air	Total
Austria	0.73	0.11	0.10	0.06	130563
Belgium	0.75	0.13	0.07	0.05	123026
Denmark	0.72	0.13	0.09	0.06	81867
Finland	0.74	0.12	0.06	0.08	79478
France	0.78	0.09	0.10	0.03	985094
Germany	0.83	0.06	0.06	0.04	1304878
Greece	0.84	0.06	0.01	0.08	191406
Ireland	0.82	0.09	0.03	0.07	64750
Italy	0.80	0.10	0.07	0.03	950362
Luxembourg	0.82	0.07	0.04	0.07	7250
Netherlands	0.75	0.11	0.08	0.07	221002
Portugal	0.83	0.07	0.00	0.06	178511
Spain	0.79	0.07	0.03	0.11	721645
Sweden	0.76	0.11	0.07	0.07	134028
United Kingdom	0.82	0.06	0.05	0.06	873229
EU 15	**0.80**	**0.08**	**0.06**	**0.06**	**6047086**

Table 2.9 Estimation of future passenger transport performance by modal share (pkm), and in total in 2010 (mio pkm) (Source: IFO – DHV)

For EU 15 the shares of passenger cars and rail are expected to remain constant: 80% and 6 %. Increase car ownership will cause a growth in road transport, but this is balanced out by growth of rail transport (high-speed rail network).

Bus transport is the 'looser' and its modal share decreases from 10 % to 8 % while air transport increases from 3 % in 1990 to 6 % in 2010. The expensive mode air transport will grow because it provides a significant gain of time preferred by many longer distance travelers above cost.

For only two countries the modal share will decrease according to IFO: the Netherlands from 79% in 1990 to 74% in 2010 and the U.K. from 85 % in 1990 to 82 % in 2010.

Present figures of freight and passenger transport in the EU already put the cost of traffic congestion, accidents, air pollution and noise at 240 billion ECU or 4 % of EU GDP. According to the EC these costs undermine European competitiveness, when transport

demand requires flexibility, reliability and cost-effectiveness (EC 1997). The projected growth of road transport certainly will aggravate these problems.

3. Trends in logistics and transport

The previous section has provided an analysis of aggregate figures of freight and passengers movement in Europe as a whole. It showed that freight and passenger movement in general and road transport in particular have increased heavily since the 1980s.

In Janssen & Drewe (1997) we have asserted that the rise of product channel logistics also known as supply chain management is an important explanatory factor for the growth in freight transport. Many industry sectors have decreased the number of the different logistic sites (units of production, warehouses, terminals for transhipment and groupage and de-groupage), while increasing their interdependent relations across national boundaries and industrial sectors. New European logistic structures are being constructed in order to be able to internationalise rationally and economically.

3.1 Logistical reconfiguration

The single European production plant is therefore no longer a rare phenomenon. There is a strong tendency in industry towards specialised production sites, serving the European and even the global market within a company's broad gamma of products. The complete range of products of a company is produced at different plants, mostly in different countries. This model also applies to plants for the production of intermediary goods. Plants for the production of finished goods serve larger markets than before. Distribution of finished products is done over greater distances than the supply of intermediate goods, which in their turn are destined to serve more plants at distances much larger than in previous years.

The outcome of this process of logistical restructuring along with the tendency towards lean production and just-in-time logistics is that shipments of (semi) manufactured goods are not only being transported over longer distances, they are also being transported in less bulky quantities.

Recent work by the Redefine project team (NEI, 1999) seems to validate our assertions. It shows that the increase of the average length of haul in combination with a growth of road tonnes-lifted and a decrease of average vehicle pay load and empty running, has caused an more than average growth of road freight movement in the EU. In the Redefine project a crude measure for the degree of plant concentration has been developed for four

countries: Sweden, the Netherlands, Germany (as it was prior to unification) and the United Kingdom, see table 3.1. The index adopted is the average value of output per plant expressed in constant prices.

	Sweden	Netherlands 1985-95	Germany[1] 1985-93	UK[2] 1980-90
Total output	28.8%	17.1%	5.8%	10.4%
No. of plants	-4.4%	-6.6%	0.3%	-32.1%
Concentration index	35.0%	25.3%	5.5%	62.5%

Table 3.1 Industrial Output, Plant Numbers and Concentration Indices (Source: NEI, 1999)

[1] as it was prior to unification
[2] data relate to plants operated by five largest enterprises in sectors

One notes a pronounced concentration in the United Kingdom, Sweden and the Netherlands. In Germany there has been only a slight tendency towards spatial concentration. One may infer from this reduction in the number of production sites, that the average distance between production and supplies locations, as well as between production locations and customers has increased. Industrial sectors which appear to have exhibited a relatively high degree of spatial concentration are wood and paper, food and drink, chemicals and transport equipment (see also NEA/Cranfield, 1994).

3.2 Logistical service providers

A further change in logistical structures that has caused an increase in freight movement is the development of so-called transhipment points; locations that carry out no product processing or storage functions but are used for consolidation and de-consolidation of freight. In fact new links are inserted into the logistical supply chains increasing the handling factor but reducing the average haul per link. This development goes along with the trend to outsource transport and other logistical functions. From the 1980's onwards is that logistics service providers are becoming increasingly integrated into the logistic solutions and channels of industry and retail business sectors. Large logistics service providers build up international networks of warehouses and transhipment nodes concentrated at particular points in the different European member states while rationalising their national networks (reduction of sites).

The rise of product channel logistics with its adoption of management principles such as Just-in-time (JIT), quick response, efficient consumer response, nominated day deliveries and booking-in/time deliveries calls for increasing flexibility of transport, This flexibility can mostly be supplied by road transport. Flexibility still is a weak point of rail and inland waterway transport. These modes too have enjoyed reductions in unit costs due to improvements in vehicle design, vehicle production processes, lower maintenance requirements, better fuel consumption. But these improvements have favoured road transport most and this fact is reflected by changes in modal split in its favour. Regulations concerning maximum length, width, height and weight of vehicles make the truck more competitive towards for example combined transport, since the efficiency in terms of transport price per shipment improves. It is often not the weight that is relevant, but rather the dimensions in terms of height and width that favour the pure road transport.

The trend towards more freight movement by road by logistics services providers is strengthened by changes in the company structure in the European road transport business.

In order to grasp these changes NEA (1997) developed a typology of road freight transport companies on the basis of the following dimensions: the type of road transport services involved, ranging from standardised services to highly dedicated ones, and secondly, the way the transport services are organised, from simple point to point transports to complex networks (NEA 1997). The four market segments also define the possible strategies of the transport companies belonging to a specific segment. The top two market segments in figure 3.1 leave space for co-operation between transport company and shipper, while the bottom two market segments might lead to co-operation among transport companies themselves. Figure 3.1 Mixed strategies applied by transport companies (Source: NEA, 1997)

The market segment of the "specialist" can best be described as point-to-point transport of large amounts of cargo over relatively great distances. Becoming a specialist takes time and specialised know-how. Often a strong co-operation between the specialist and shipper exists. The specialist is facing relatively little international competition. Due to the relatively strong relationship with the shipper, foreign markets are hard to access.

Internationalisation is done by taking over foreign companies or building up a strong co-operation with similar companies.

The market for the vertical "logistics chain director" is strongly influenced by shipping industries. The company is closely located to 'its' shipper. The service provided goes far beyond transport only. Well-known examples are value-added logistics as well as warehousing and physical distribution. Transport itself is often contracted out to charters, while the contractor concentrates on forwarding, control and management. The vertical integrator faces hardly any international competition.

The business of "capacity focused companies" mainly consists of Full Truck Load transport (FTL-transport), mainly general cargo. Core business is transport itself, sometimes according to predefined schedules, sometimes on an ad-hoc basis. The representatives belonging to this market segment are relatively small and often contracted by larger transport companies. Access to this market is relatively easy. This type of company faces very strong international competition.

The "networker" is a very large company with subsidiaries in several countries. The market for the networker is a combination of international point-to-point transport linked with national or regional networks for the collection and final distribution. Services are provided with an extremely high frequency. Within the network, shipments are consolidated and transported on a door-to-door base, often Less-than-Truck-Load (LTL-transport).

Table 3.2 provides data on the development of the four segments of the typology. The data refer to the period 1986 to 1992 and are calculated for bilateral border-crossing inter-EU transports.

	Specialist	Vertical integrator	Capacity focuser	Networker	Total
Germany	123	134	121	120	122
France	179	182	167	187	176

Italy[1]	88	78	113	93	94
Netherlands	142	204	163	150	158
Belgium[2]	139	198	167	159	160
United Kingdom	211	370	241	208	241
Ireland[3]	72	93	105	126	98
Denmark	147		138	136	146
Greece	128	115	303	117	129
Spain	227	66	296	210	230
Portugal	300	274	352	476	345
EU total[4]	**157**	**204**	**159**	**160**	**162**

Table 3.2. The development of the four types of road freight transport companies, performance in million ton-kilometres, index 1986 = 100

(Source: NEA/EUROSTAT)

3.3 Passengers mobility and logistics

How about applying logistical concepts to passenger's mobility, to wit air transport? The emerging approach of "seamless multimodal mobility" could be of interest. Apart from some pilot projects, this still is rather a research programme (Bovy, 1996). The general idea is to design unprecedented multimodal personal travel services in a ubiquitous information environment.

The future transport system will be an integrated, flexible multi-layered network of various types and forms of transportation services, linked together in intermodal transfer nodes. This service network is supported by physical infrastructure links and nodes as well as extensive ICT networks for travelers, service providers, vehicle drivers and public transportation operators. Essential requisites for attractive multimodal trips' chains are:

- provision of well-designed multimodal transport services networks;
- availability of omnipresent up-to-date information in behalf of travelers, integrators (professional trip chain organizers) and transport operators;
- perfect coordination and control of individual trip chains;

1 Period 1989 until 1992 (1989 = 100).

2 Figures refer to 1986 until 1991 (1986 = 100).

3 Figures refer to period 1986 until 1991 (1986 = 100).

4 Figures refer to 1986-1992 period.

- high performance and infrastructure facilities, especially intermodal transfer points.

Air passenger transport of airports for that matters, could be dealt with as an integral part of a seamless, multimodal trip chain.

4. Uncertain futures

Most of the estimations of future demand of freight transport in Europe and reflections concerning the consequent seaport and airport development depend on the following assumptions. First, most estimations are in fact extrapolations of existing average trends in transport demands. Second, they are based on existing structures and networks of freight transport in Europe (Cranfield University, 1997). It is this second aspect that we shall specify, since freight transport structures in Europe may change drastically within a period of, say, 10 to 15 years (as we have indicated in section 4 where we have dealt with the strategic behaviour of actors in transport and logistics). Let us start with airfreight transport networks and, consequently, the future position of Schiphol as a major European 'hub'. Then we shall look at the example of future cargo transport in the port of Rotterdam.

As to European airfreight, it is generally assumed that the structure of the transport networks will be a constellation of different hub & spoke networks. European carriers like KLM, Lufthansa, Air France and British Airways increase their emphasis on their main base with intra-European feeder traffic and even feeder traffic from other world regions. Infrastructural investment strategies of national authorities concerning airports are also heavily based on this development model.

In a study, commissioned by the Dutch government, Cranfield University (1997) pointed, however, to a number of important uncertainties regarding these hubbing strategies:

- **Uncertainties of transport policy and environmental legislation**.
  What will be the effects of "Open Skies" for national flag carriers when their 'client' airports will be opened to competitors? Will the regimes of 'favourable slots' continue or will there open processes of 'auction' of slots?
- **Uncertainties of passenger preferences.**
  What will happen to transfer traffic when external costs are internalised in the pricing of air transport? How will people react when hubs show diseconomies of scale?
- **Uncertainties related to ICT-developments.**
  What will be the effects of the growth and subsequent impact of video-conferencing, teleworking and wireless communication?

- **Uncertainties of aircraft technologies with regard to size, noise and pollution.**
  Will new aircraft technologies possibly lead to easier connections by direct flights?
- **Financial uncertainties.**
  If there will be more directs flights, what about the huge investments into large aircraft such as the Boeing 747? Already now, mid-size long distance aircraft now perform 90% of all flights from North America to Europe, while the 747-share of Europe is still 45%.
- **Uncertainties with regard tot airline network strategies.**
  Operating large hubs and trunk lines does often not lead to increasing profitability. Therefore integrators are looking to other freight transport models such as using less the 'overnight concept' and establishing more direct relations between the satellite hubs instead of just one central hub.

All these uncertainties may lead to situations in which the dominant and 'traditional' hub & spoke model in airfreight transport is no longer valid. Already today we can discern a decentralised network in which air cargo from Southern Europe to Scandinavia is transported via regional airports and not through the big European hubs. Another example of this non-central hub strategy is the fact that second tier airports are directly interrelated.

If we look at projections of traffic of goods in the different ports of the Hamburg - Le Havre range, we may see that every port is striving to be amongst the winners. Growth ratios of 4 per cent per annum are not uncommon, while the yearly increase of the European economy in the period of 1975 – 1999 has just been around 2.5 %. For the port of Rotterdam an average growth rate of 2.8 % is expected for the period until 2020. Goods handled in Rotterdam amounted up to 297.3 million tonnes in 1995. If the European economy takes a slow development path (the so-called "Divided Europe Scenario"), it is expected that the transfer of goods will grow to 379 million tonnes. Following a scenario of high economic development (the so-called "Global Competition Scenario") transfer of goods will grow to 480 million tonnes by the year 2020. The container sector will account for almost all of the increase. Rotterdam will change from an "oil port" to a "container port", particularly in the Global Competition Scenario (Port of Rotterdam, 1998). Major infrastructural investment programmes such as the Betuwe Line are based on this strategic development model.

A closer analysis of the model, however, reveals a number of important uncertainties.

- **Uncertainties regarding growth potentials.**

  The projection of future flows of the port of Rotterdam is, basically, an extrapolation of existing trends. Technological and logistical innovations may change these trends drastically. Furthermore, the competitive strategy of Rotterdam seems to focus on scale and costs rather than on differentiation and specialisation. If we look, however, at the results of this strategy, actual growth rates of container traffic in the port of Rotterdam indicate that since 1987 the relative share of Rotterdam in total container traffic within the HLH-range has decreased. Nevertheless, it is assumed that Rotterdam will be able to reverse this trend. But on the base of what capabilities?

- **Uncertainties with regard to the 'natural' hinterland.**

  Every port has its own catchment area where transport opportunities make it a 'natural' choice when choosing ports of entry or export. These transport opportunities are mainly influenced by total transport costs in combination with logistical lead times (Drewe & Janssen, 1996 and 1998). Due to the TEN's, it may be expected that the catchment areas or hinterlands of the different ports of the HLH-range will overlap more strongly, changing the transport opportunities which favour the 'natural' choices of ports. Will the port of Rotterdam be facing more competition even in its own natural hinterland?

- **Uncertainties in transport policy and environmental legislation.**

  Nowadays road freight transport is a very important mode of transport of containers to and from the port of Rotterdam. What will happen to this transfer traffic when external costs are internalised in the pricing of road transport? What will be the average price of road transport of containers? Will it be considerably less than it is today?

- **Uncertainties related to shipping technologies.**

  Today, economies of scale are the driving force behind the tendency of containerships to call at a limited number of big ports at both sides of the Atlantic. A typical container ship routing could be Bremen/Rotterdam/Thamesport/Le Havre/NY-Newark/Norfolk. New shipping technologies such as 'FastShip' may change this type of overseas container transport. The FastShip is a vessel carrying 1,400 TEU, reducing the 17 - 25 days of delivery to less than 7 days. The potential of this new type of vessel is

suggested to be around 25 % of the seafreight container transport market (Cargo Vision, 1999). So, will the future market be considerably less than projected?

- **Uncertainties with regard to 'mainporting'.**
  Container shipping lines are always seeking to reduce costs in order to survive, meaning ever-larger ships and ever-bigger port terminals to handle the increasing volumes. Big ports already show increasing congestion in and around terminals, leading to growing overall logistical and environmental costs. The new shipping technology referred to require direct port-to-port connection on each side of the Atlantic. Combined with efficient feeder services (rail and intermodal transport) will the direct fast ship freight transport threaten the competitive position of the so-called mainports? Could it even be a challenge to airfreight?
- **Financial uncertainties.**
  If there will be more direct port – port traffic, what about the huge investments into large container terminals such as Rotterdam, Bremen , Antwerp and Hamburg?
- **Uncertainties of transport network strategies of logistics services providers.**
  With the growing importance of "networkers" and "integrators", shippers and forwarders are more and more invited to deliver to the nodes of the networks of these providers than to sea (and air) ports directly. Very often the logistical service providers choose many ports, even smaller regional ports, depending on the volumes and directions of flows of goods and (empty) containers in their transport networks. Will concentration in particular big ports continue, or will there be a decentralisation of traffic into smaller ports?

Projecting future development trajectories with existing historical trends is not completely satisfactory. Too, new potentialities have to be examined systematically.

5. FROM NODES TO NETWORKS

In a competitive world of ports, growth of volumes (tons of freight as well as number of passengers) still is considered as the foremost criterion of success. And the future of ports is seen as one of extrapolated growth of volumes. Even if "more of the same" implies exponential growth basically (assuming no limits to growth whatsoever). This is, of course, a simplification but therefor not less true once the policy reports are stripped of their (sophisticated) verbosity.

'Volume thinking" also lies at the basis of the positioning of ports. It is important to outdo one's competitors, say, the other seaports of the Hamburg-Le Havre range. This in order to stay or become the main port of Europe or Europe's number one container port for that matter. Airports want to stay or become intercontinental gateways or, at least, continental hubs with some ICA-function.

These ambitions -together with the assumption of extrapolated growth of volumes- pressure for the physical expansion of ports at their present location or even at a new location. New public investments in physical accessibility are claimed in order to secure the future position of the port. Moreover, the improved physical accessibility must be multimodal, in especial adding (better) railway links to the present infrastructure (a Betuwe Line, an "Iron Rhine" or a high-speed train link).

5.1. From 'volume thinking' to ' logistic thinking'

"Volume thinking" neglects the logistic revolution, in particular the rise of product channel logistics or business logistics. What may be referred to as "logistic thinking" has a double impact on the conventional positioning of ports. The emphasis shifts from volumes to value added and from physical to logistic accessibility. Even simple rules of thumb can show that it is possible to create the same amount of value-added or even more value-added in seaports by shipping lesser volumes of goods (Drewe and Janssen, 1998). In the case of air-freight a similar analysis has been carried out applying the concept of the so-called air-freight cube based on value density, urgency of transport and volume density (Drewe and Janssen, 1999). It has also been advocated to segment the air passengers' market according to differences in value added.

Logistic accessibility (based business and transport logistics combined) is expressed in lead time, the time elapsing between ordering and delivering goods, usually within an order cycle time of 24 hours (depending on the type of goods, there are also rush and stock orders).

The analysis has to start from the demand side, which is a lesson learned from a recent European logistics expert meeting:

- first, there are multinational companies responding to their clients' needs (the companies represented were, among others, Enso, Buena Vista, General Motors, Ciba, Barilla, Clariant and Yamaha)
- second come logistic service providers employed by these firms to set up a logistic chain which allows to deliver goods in time to the point of sales.
- third, in order to compose this logistic chain, a choice is made of modes of transport, European or regional distribution centres and transit platforms.

Logistic chains necessarily tend to be tailor-made. Figures 5.1 to 5.4 show four patterns (Wagner Güller and Pillet, 1999), just for the sake of illustration, i.e. logistic chains:

- without both European and regional distribution center,
- with regional distribution center,
- from overseas factory with European distribution centre over transit platform in country of destination, -
- from overseas/European factory with regional distribution centre and transit platform in country of destination.

Hence the logistic services market is essentially a buyers' market whereas the conventional positioning of ports and subsequent investments in infrastructure or (multimodal) physical accessibility are essentially supply-driven. To achieve a match between supply and demand, ports and logistics service providers must act in a concerted, networked manner. Ports acting as if their market were a sellers' market could produce oversupply or the wrong kind of supply. What is at stake here is the linkage between public investment in ports (transport infrastructure) and long-term employment as well as value added.

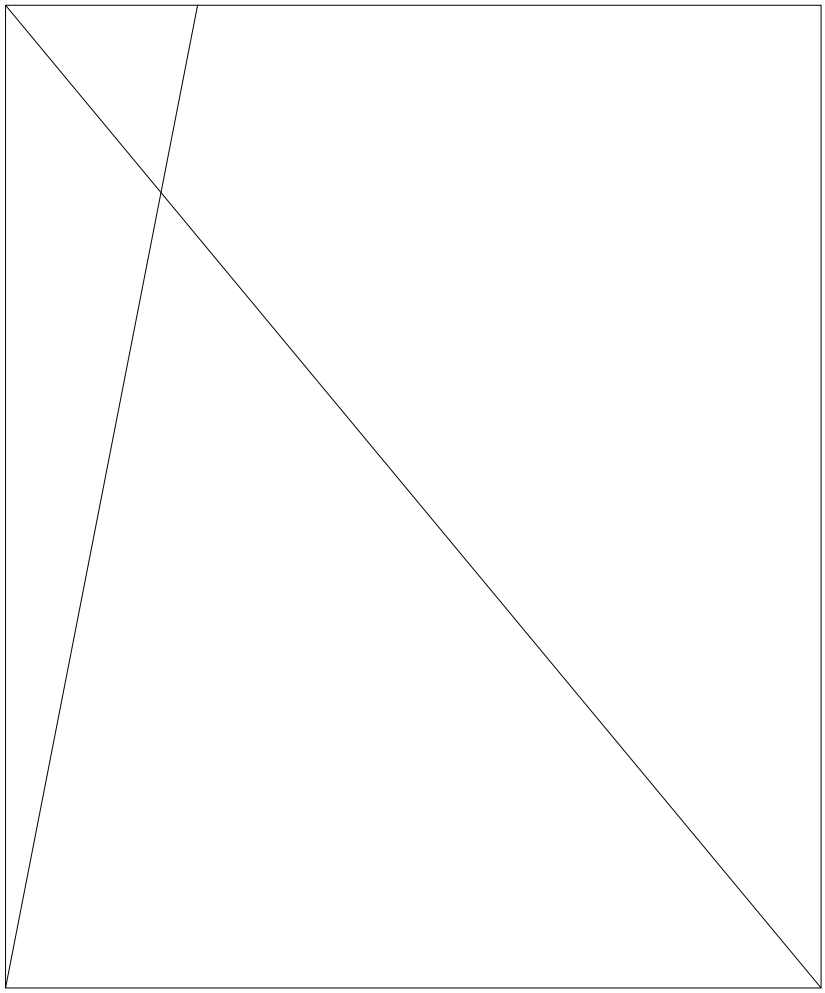

Figure 5.1 Logistic chain from factory to Point of Sales (POS) without European (EDC) and Regional Distribution Centers (RDC).

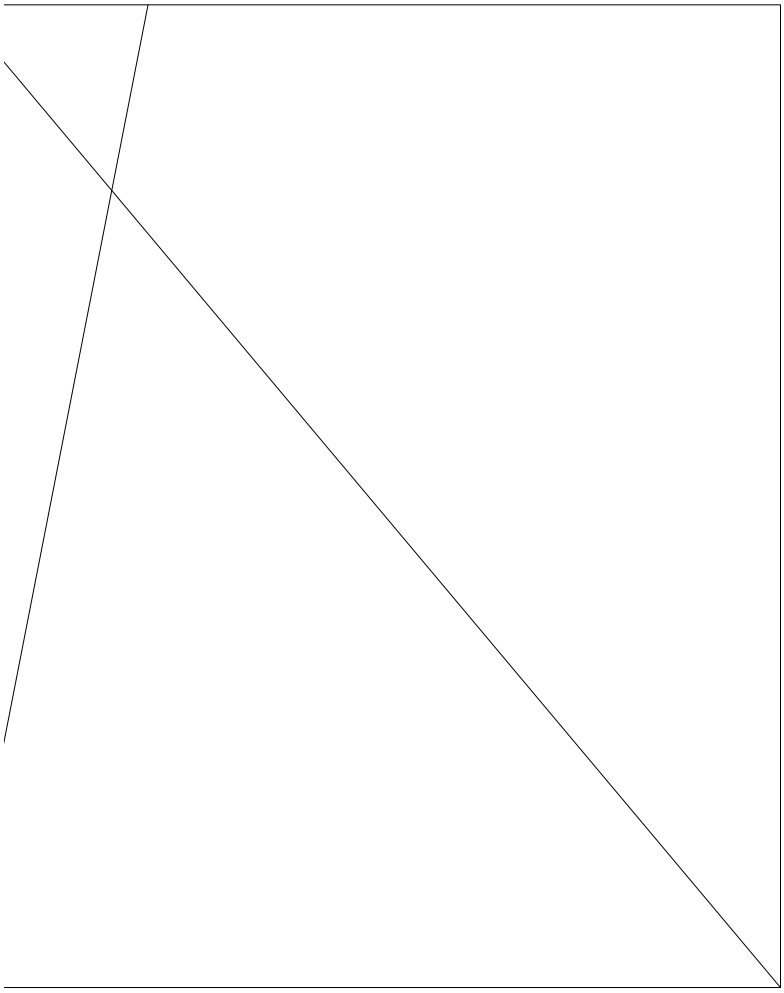

Figure 5.2 Logistic chain from factory to POS with RDC.

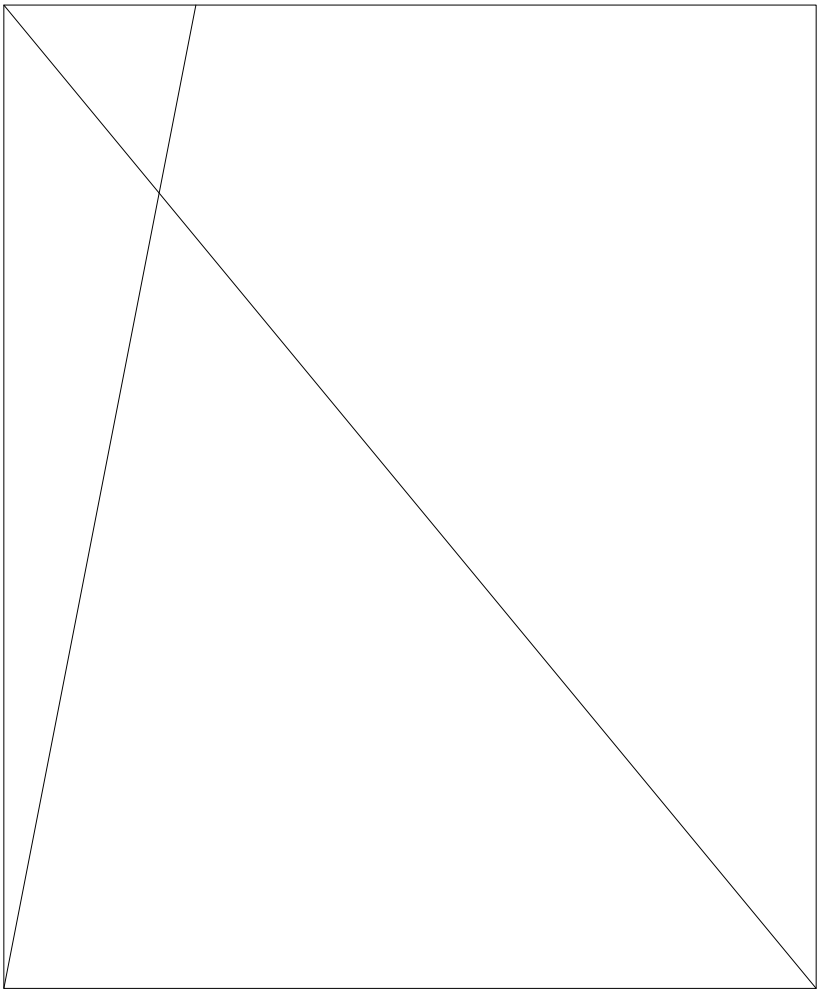

Figure 5.3 Logistic chain from overseas Factory with EDC and from there direct distribution to POS over transit platform in country of destination.

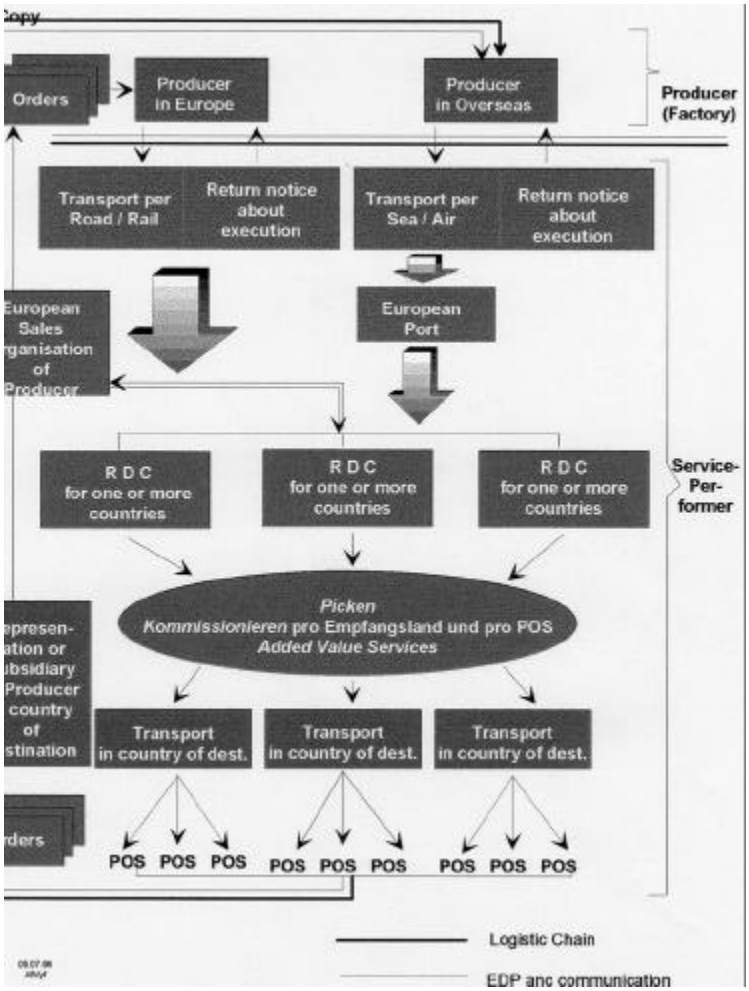

Figure 5.4 Logistic chain from overseas/European factory with RDC and transit platforms in country of destination.

After all, modern logistics could be a better means to an efficient use of the existing capacities than new investments in rail or road infrastructure. And the "logistics infrastructure" -apart from transport connections- requires EDP, warehouse, personnel, sub-contractors, return loads, potential and customer mix.

5.2 Managing uncertainties

The simplistic growth model of extrapolated growth of volumes tends to ignore uncertainties. See section 4. Generally speaking, uncertainties are not very popular with planners and decision-makers as, for example, the case of the Betuwe Line has shown (Janssen, Drewe and Hombrink, 1997).

But whenever scenarios are formulated, this is a sure sign of uncertainty related to processes, objectives and means.

There are also scenarios with regard to locational models of logistics, hence affecting the position of ports. In especial, two contrasting models have been sketched: polarisation or diffusion?
According to Colin (1996), we may be heading toward a "logistic oversupply" or a "scarce resource" scenario.

Logistic oversupply in a small number of zones will give rise to environmental opposition because of a deterioration of air quality, noise, accidents, congestion and saturation. This, in turn, will lead to a model shift ("green transport") and the relocation of logistic sites.
In the scarce resource scenarios, firms will revert to a diffusion model with more locations covering smaller areas. Benefiting from the reaction to logistic oversupply and infrastructure pricing in saturated areas, firms will relocate to areas where space is available and operating conditions are good. Note that the two scenarios are rather interrelated or complimentary than antagonistic.

Once uncertainties have been identified, the question rises how to manage them. Take for example, the Port of Rotterdam (1998). Integrated projections for port and industry have been put forward, based on contrasting scenarios: (an optimistic Global Competition scenarios as against a less optimistic Divided Europe Scenario). The former pressures for an expansion of the port area in the short run. The uncertainty mirrored by these scenarios is "solved" by opting for the favorable scenario implicitly hoping for a competitive edge over competing ports, a sellers' market and the synergy between port, public institutions, business and industry necessary for turning the growth model into self-fulfilling prophecy.
How does this example relate to the "art of managing uncertainties"?
Uncertainties, firstly, can be reduced in several ways:

- further research as far as processes or the operating environment is concerned (an approach advocated by Cranfield University, 1996).
- clearer objectives:
  this criterion is fulfilled in the case Rotterdam as the Port opts for "more of the same";
  more research on the logistic revolution, however, could open new windows of opportunity leading to alternative objectives.
- more or rather different means in order to achieve the objective:

the emphasis being of the port being primarily put on future space allocations.

- a more coordinated approach involving relevant partners:
  public institutions, business and industry are mentioned, but no mention is made of ports hitherto competing, say, Antwerp (but later for that).

Reducing uncertainties as indicated may go a long way, but unlikely the whole way. So it is inevitable to accept uncertainties to some extent, Then one can resort to flexibility to be achieved by an intelligent phasing of the implementation of plans (e.g. for port expansion): distinguishing immediate actions, delayed actions and contingency plans. Of course, one can also opt for a (risky) laisser-faire.

In recent years another way has emerged, referred to as innovative environment (milieu) and/or knowledge infrastructure. This could cater for the need of a port to be continuously innovative. A synergetic interaction and co-operation between key actors is an essential part of this. An innovative environment emphasises the use of endogenous development potentials and a strengthening of regional production over a competitive-location scenario (traditional growth-oriented regional policy, dominated by "economics of scale" thinking). Or put differently, a strategy of "regional activity master" (high value, high tech, low cost) over that of a "global flow master (high volume, high tech, low cost).

Several examples, or, at least, "sources of inspiration" exist:

- the European Research Group of Innovative Environment (GREMI) has provided evidence on innovative milieus; see also the critical evaluation of the Gent city region's move towards an urban innovative environment (Drewe, Allaert, De Klerck, 1999)
- the International Scheldt Faculty as an example of a cross-border knowledge infrastructure (Drewe, 1998)
- the "milieu policy" led scenario for the Hamburg region (Läpple et al,. 1994)
- the Regional Technology Plan, a pilot action of the European Commission(1994)
- Rotterdam's Foundation of Knowledge Infrastructure (Stichting Kennisinfrastructuur, 1995)

5.3 In need of a EU approach

The European union shows a skewed spatial distribution of ports. Northwest Europe dominates because of the Hamberg-Le Havre range, in particular Hamburg, Rotterdam and Antwerp, as well as the triangle of intercontinental gateways in large domestic markets (Heathrow, Frankfurt, Charles de Gaulle and their satellites). And there is also Schiphol, an intercontinental gateway in a medium-sized domestic market.
Northwest Europe is also densely populated, urbanised, congested (roads and other modes of transport) and environmentally vulnerable. All of this to a high degree.

Is this a desirable situation in a European Union committed to:

- economic and social cohesion,
- sustainable development,
- balanced competitiveness for the European territory?

The problem is addressed by the European Spatial Development Perspectives (ESDP) (Communautés Européennes, 1997). European policy, generally speaking, is set to achieve a more balanced spatial distribution of productive activities in order to correct for the current trend of concentration in the most competitive regions.

Closer to our topic is the promotion of a more balanced intercontinental accessibility at the arrival at and departure from major seaports and airports. Existing inequalities ask for appropriate adjustments of air transport and the creation of a European network of major seaports. At one of the so-called transitional seminars, held in Naples, the question was raised more succinctly: what perspective for the periphery? In fact, there are three "peripheries" in the EU defined in terms of maritime basins: the Mediterranean, the Baltic and the Atlantic. The former seems to come first, with the Baltic being of strategic importance to future developments in Central and Eastern Europe. Whereas the Atlantic is more difficult to figure out. It seems to suffer from the geographic imagery of the "Atlantic Arc". It is interesting to note that logistic service providers speak of a trend towards segmentation of Europe in two zones, Northern and Southern Europe: North of the line Austria/Switzerland and the line Lyon/Bordeaux including Poland, former Czechoslovakia, Baltic States - as against - South of the line Austria/Switzerland, Italy,

France (South of Lyon-Bordeaux), Spain, Portugal, Greece, Hungary, ex-Yugoslavia, Romania, Bulgaria.

According to Cargo City (Malpensa), the North and South each cater to the needs of 190 million consumers.

There are no clear-cut solutions yet, only some avenues that eventually might lead to solutions, among them:

- A concerted move from polarisation (logistic oversupply scenario) to diffusion (scarce resource scenario)relieving pressure on the Northwest-European "center" and opening windows of opportunity for the "periphery". The same holds for a strategy of selective growth and shrinking for the North, based on logistics thinking rather than on volume thinking.
- A strategy of complimentary cooperation between ports instead of today's cut-throat competition, leading to a new hierarchy of distribution centers. This strategy could strengthen the competitiveness of EU port vis-à-vis the rest of the world.
- A sustainable scenario tackling the social costs of all modes of transport through:
- reduction of total number of ton-kilometers,
- technical improvement of vehicles ("green technology")
- optimization of transport logistics ("green logistics")
- shift to environmentally less damaging modes of transport ("green transport").

See Drewe and Janssen (1998, 1999) for details.

Who are the players in this?

The largely public controlled supply side is only one of them. We have already shown that the demand side is a major player, manufacturers and their clients, distributors, transport operators and last, but not least, logistic service providers. And there is certainly a need for a supranational, European orchestrator. But can the EU play? The test of the "ESDP pudding" is in the eating. New Transeuropean Networks can be an important tool or "eurocorridors" for that matter (not only the existing multimodal ones, but also those with a development potential).

Will a broad political debate, innovatory and experimental actions and technical assistance produce the desired results?

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